

on its longitudinal axis through 180 degrees, so that the penis and claspers will be exposed ventrally and thus may be directly everted to enter the valves of the female body. I actually saw this act take place in a number of cases; whether or not it occurs in all pairs I cannot say but it seems likely that it does, the male genital cup being constructed as it is. I have an idea that such behavior is common in other pentatomids as well for it is not at all uncommon to find pinned specimens, in collections, in which the male genital segment is inverted, the specimens possibly have been taken during or just after copulation.

During the process by which the male completes the insertion, the female rests quietly but opens, slightly, the pairs of wings and when so doing automatically opens the valves of her genital segment. When the physical contact is completed the male then proceeds to dismount and remains in copulation attached to the female endwise as is typical of so many other heteroptera.

During the last stages of the mating, the male, facing in the opposite direction to that of the female begins vibrating his hind legs; in doing this he causes his tarsi and tibiae to brush the lateral edges of the female's abdomen, possibly transmitting to her some erotic stimulus. The rhythm of the beating seems to be timed; without the use of an accurate device no exact count could be made but the vertical movements of the legs appear to occur about two or three times per second.

How long the pairs remain in copulation I did not determine; certainly most of them keep up the physical contact for two hours, for it was that length of time I spent in making most of these observations. When disturbed some pairs would separate but most moved off to a nearby locality and the males would, after a brief interval, start the rhythmic beating of their hind legs all over again.

NOTES ON THE LARVAE OF HELIOTHINAE.

BY ALEX K. WYATT, Chicago, Ill.

A renewed interest in *Schinia* and allied genera has resulted in the discovery of the early stages, heretofore unknown, of several species and additional data on others found in the Chicago area.

Heliothis phloxiphaga G. & R.

This has been reared several times by Mr. Emil Beer and others besides myself from larvae feeding on blossoms and seeds of Columbine, *Delphinium* and New England Aster. Single larvae were also

reported found on bindweed (*Convolvulus*) and on the small ragweed (*Ambrosia elatior* L.). There are apparently two broods in this area, larvae having been found in early June and in September and October; the moths in May and again in July and August. Hibernation occurs in the pupal stage.

Dasypoudaea lucens Morr.

Capture of this moth by Mr. Maurice Bristol on July 3, 1935 was the first report of local occurrence, the two specimens taken being found resting on the opening flowers of lead plant (*Amorpha canescens*). A determination to find the larva resulted in a trip to Elgin on August 9, 1936, with Messrs. Bristol and Arthur Herz. The first quarter hour examination of lead plant proved fruitless, but after the first beautifully checkered larva was found, it became an easy matter to locate more of them on the densely flowered terminal spikes. The protective resemblance is pronounced, yet they drop quickly when disturbed. They fed through quite rapidly and pupated by August 17. Considerable parasitism was noted. Mr. Beer to whom I gave some pupae, and I, succeeded in obtaining twelve moths from about twenty pupae and some of those remaining appear to be alive and we hope will develop next year. The moths all emerged within a very few days, July 8 to 13. Messrs. Bristol and Herz were unsuccessful in carrying the pupae through the long period of almost eleven months.

Rhodophora gaurae A. & S.

This is not rare with us and flies for an extended period, July 18 to September 8 being recorded. Both moths and larvae are found on *Gaura biennis*. An occasional specimen will emerge in September from pupae of the same year, but once hibernated, they do not emerge until the following July.

Rhodophora florida Gn.

This is usually reported as feeding on evening primrose (*Oenothera*), but we find it more commonly on *Gaura biennis* with *R. gaurae* and the same data and remarks apply.

Lygranthoecia thoreau G. & R.

Larvae of this species were found by Arthur Herz feeding at first on the male bloom of the great ragweed (*Ambrosia trifida*) and later on the seed vessels in the axils below. The young larva is green with black spots dorsally, the more mature larva a brownish grey, unspotted, and with a large head. Mr. Herz tried for several

years to carry pupae through to emergence, but was unsuccessful. I too, failed on my first attempt, but this year several specimens emerged, one of them from a 1935 larva. This proved the identity which we had suspected. The moths are apparently quite sluggish for comparatively few have been taken. Young larvae have been beaten from the flowering heads from several localities and the species is probably not nearly as rare here as it has been considered heretofore. Mr. Herz tells me that the larger larvae hide during daytime in the dead leaves on the lower part of the plant stalk.

Lygranthoecia marginata Haw.

The larva of this species feeds on the small ragweed (*Ambrosia elatior*) and can be found over a long period, as late as October 14, 1934, being reported by Herz.

Schinia trifascia Hbn.

On September 2, 1915, Mr. Beer and I found quite a number of moths on bloom of *Eupatorium serotinum*. In 1934, when my interest in this group had been revived, I sought and found the larvae, both on *Eupatorium sessilifolium* and *E. perfoliatum*. These pupated September 20 to October 2. Parasitism was severe and only two pupae resulted, from which I secured one moth on August 6, 1935.

Schinia arcigera Gn.

This species feeds on *Aster puniceus* and *Aster laevis* according to Mr. Henry Bird, who described the larvae (Ent. News, XXXIV, pp. 193-199, 1923). Mr. Herz and I found a few larvae September 30, 1934, on a common white aster, probably *A. multiflorus*. One pupa was secured from which the moth emerged September 16, 1935.

Rhodoeccia aurantiago Gn.

This species is now classed with the Heliothinae. In 1930 when collecting with Mr. Herz at Tremont, Indiana, we discovered a clump of *Gerardia grandiflora*. Because of his experience in Germany, he recognized it as a likely food plant for blossom feeding larvae and sought for and found one small larva, which grew to maturity, but was lost in some way. Another larva in 1932 also disappeared. On August 27, 1933, on a trip to Waukegan, Illinois, Herz, Beer, A. L. McElhose and the writer found *Gerardia* plentiful and it was not long before we found larvae. The bright yellow blossom of *Gerardia grandiflora* fills out to a considerable size be-

fore it opens. We found that the young larva apparently entered the head end of the blossom by a small round hole and then seemingly sealed the opening with a parchment-like material that may have been silk, but was impossible to identify in the field. The larva, safely housed within, fed on the ovary and stamens, finally eating its way out through the corolla and seeking another blossom. Larger larvae which are almost black in color, were found hiding under leaves or other cover at the base of the plants. These larger larvae left unmistakable signs of their presence in the badly mutilated blossoms or the empty, partly blackened seed vessels. *Gerardia pedicularia*, a species with much smaller bloom, was also affected quite as freely as the larger species. At home, when the original food plant was not available, the larvae were given garden snapdragon and butter-and-eggs (*Linaria*). These proved acceptable substitutes. Pupation took place September 1 to 14 and the moths emerged July 21 to August 8, 1935. One specimen from these 1934 larvae remained in pupa until July 5, 1936, and three others did not emerge until August 9-10 and 14 of 1937, having lain as pupae through three winters. They were exposed to severe cold each winter, care being taken to avoid sudden changes of temperature.

Pyrrhia umbra Hübn.

This also is now included among the Heliothinae. The larva has been found on *Desmodium*, on choke cherry and on *Pentstemon*, feeding on the blossoms and seed and sometimes on the tender foliage. Numerous records of captures from May 8 to October 30 and records of young larvae found June 20 and August 8, indicate at least two broods. Two very small larvae found June 20, pupated on the same day, July 8, but the moths emerged August 14 and 31 respectively, showing a considerable divergence in pupal period and probably accounting for the extended period of flight.

One other species, as yet unidentified, is definitely on my schedule for 1938 collecting. The single larva found on *Liatris cylindracea* failed to pupate, so I shall have to try again.

For the benefit of collectors who might look for larvae of *L. thoreau*, it may be well to mention other larvae that are likely to be encountered on *Ambrosia trifida*. Most commonly found will be the green larva of *Ogdoconta cinereola*. Next will be a semi-looper resembling bird droppings. This will develop into *Acontia erastrioides*. *Drasteria erechtea* and various Geometridae are also to be found, but one larva that is not uncommon in some areas, resembles

L. thoreau in general appearance and habits. This is *Plagiomimicus pityochromus*, which makes a practice of hiding in the dry leaves on the lower part of the plant stalk. This larva is smaller than *thoreau*, blackish rather than brown 'grey and has a black patch dorsally just behind the head.

A few words on the subject of rearing the larvae may not be amiss. Tightly closed boxes or jars to keep the food plant fresh will do while the larvae are small, but my experience has been that these larvae will thrive better if given plenty of air and kept somewhat sheltered or warm during the day. A little sunshine will do no harm. When we were active in rearing *Papaipemae*, Emil Beer devised a practical scheme, which I find very convenient. It consists of a cylinder of screen wire fitted over the edge of an ordinary flower pot of suitable size, the open end being covered with cloth tied in place or with glass fastened by means of a wire or string through the screen meshes. The whole can be set in a saucer and the earth in the pot watered from below. For *Schinias* and the like, I place a sheet of paper over the earth, leaving holes or a margin for larvae to get below it. Put the food plant in a bottle or jar with water and set on the paper, cover the pot and let them go for two or three days or as long as the food plant remains in good condition. The paper will collect a good deal of the frass and can be discarded when fresh food is supplied. Care must be taken to provide access to the food, for many larvae cannot climb the sides of a flower pot. Old stems leading to the screen or to the new food supply from the soil surface will answer admirably. The bottle or jar must be packed to prevent larvae from crawling into the water and drowning. An occasional spraying of the food plant with water may be helpful.

Pupae are taken from the soil and are kept in a similar flower pot on top of the soil. They should be covered with sphagnum moss with a layer or two of paper over all to keep out some of the dust and should be stored in a cool place; an unheated porch or a garage that does not become foul with gas fumes, will do. For want of a better place a wooden box in the open will serve, but water should be prevented from draining into the flower pot. An occasional handful of snow on top of the moss or moistening with water is helpful, always bearing in mind that the colder the temperature, the less moisture is needed. When the weather warms, more moisture must be supplied and when emerging time approaches, I aim to supply both moisture and heat from a sunny window or warm kitchen, to approximate natural conditions.